



TWO CASES OF COMPLETE LARYNGEAL STENOSIS
PRODUCED BY WOUNDS OF THE LARYNX IN
ATTEMPTED SUICIDES, TREATED SUCCESSFULLY
BY MEANS OF TUPELO DILATORS; ALSO A CASE
OF SYPHILITIC STENOSIS TREATED IN THE
SAME WAY.

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COMPLETE laryngeal or tracheal stenosis is so uncommon as a consequence of wounds of the neck, that the two cases first referred to in this paper are worthy of being recorded. The treatment adopted was not only novel but also satisfactory.

The first case was that of a woman, aged 32, who was admitted into the Ward for Diseases of the Throat in the Glasgow Royal Infirmary, in February last. On enquiry, it was found that three months previously she had attempted to destroy herself by cutting the windpipe immediately below the cricoid cartilage. The wound extended transversely across the trachea, so as almost completely to separate it from the larynx. After the injury was inflicted, a tracheotomy tube was inserted by a medical attendant, and retained in position. When admitted to the Ward, a wound was seen in the neck through which a moderate sized tracheotomy tube was passed, on the removal of which a firm cicatrix was found to encircle the opening, and extend laterally for a distance of half an inch. On laryngoscopic examination, the epiglottis was found to be distorted and dragged backwards and downwards, so that it was with considerable difficulty that the larynx was seen. After repeated and careful examination, the interior of that cavity was found to be occupied by a mass of firm cicatricial tissue, which extended from the level of the true cords to that of the tracheotomy wound, a distance of about three-quarters of an inch.

Through this mass no passage could be discovered, either by the mirror or with the probe, and even on exertion, no air could be forced through it by the patient. Frequent attempts were made to pass bougies and probes through the stricture, both from above downwards and from below upwards, but without success, until one morning, having made an incision with a laryngeal knife into the upper part of the tissue, as it appeared between the vocal cords, a small sized and sharp pointed laryngeal probe was forced through the stenosed parts and brought out by the tracheotomy wound. To the end of the probe two strands of silk ligature were tied and dragged upwards through the larynx and mouth, and the two free ends were knotted externally. The following day the ligature was found to have made room for itself, whereas when introduced it completely filled up the opening made through the larynx by the probe. The free ends being untied, to the upper thread four strands of ligature were fixed, so that by dragging upon the lower one these four threads were carried through the mouth and larynx and out through the wound in the neck. By so increasing the thickness of the skein day by day, the larynx was gradually and steadily dilated until the passage was large enough to admit a No. 10 urethral catheter. As this was as much as could be conveniently done in the way of dilatation by means of ligatures and cords, an endeavour was next made to increase the size of the passage by inserting one of Sussdorff's tupelo (Nyssa) dilators, commonly used for dilating the os and cervix uteri. One of these, of the diameter of a No. 6 catheter, was introduced into the larynx by fixing the point of the wood dilator to the lower end of a cord which was passed through the mouth, larynx, and tracheotomy wound. By drawing upon this cord with the left hand, and by manipulating the dilator with the right, it was partly pushed and partly dragged into the larynx. Through the lower end of the little piece of tupelo wood a strong ligature was passed, and the tracheotomy tube having been inserted, the lower end of the dilator was firmly tied to its upper or convex surface, and thereby any danger of displacement was obviated. In two days this dilator was removed, and one the size of a No. 12 catheter substituted, and in the course of a week the passage through the larynx was enlarged sufficiently to admit the pharyngeal limb of an artificial larynx, which permitted the patient to breathe by the mouth, and converse in a whisper, or in a loud monotone by the employment of a reed.

The second case is in its etiology, progress, and treatment, almost identical to the one just described. The patient, a man aged 24, was admitted into the Royal Infirmary in April of this year. The history of the case showed that, in September, 1887, the patient inflicted a wound upon his neck with a sharp knife, so as to divide the trachea almost completely from the larynx, and at the same time considerable injury was done to the tissues around. The case was treated as one of cut-throat, and the patient was permitted to breathe through the wound, no tube being inserted till six weeks after the occurrence.

The tracheotomy tube was still retained in position immediately below the cricoid cartilage. Examination of the wound showed that above the level of the tube the larynx was completely stenosed so that no air could pass to the lungs from the mouth or nose, and the patient was unable to speak except in a very faint whisper produced by a vibration of the air in the buccal and nasal cavities.

On laryngoscopic examination the larynx above the level of the vocal cords was found to be perfectly normal, but a quarter of an inch below them the sides of the trachea were seen to meet in the middle line, with a depression in the centre running parallel to the vocal cords when in full adduction. The cords were stationary in the position of complete abduction.

Exactly the same treatment was adopted in this as in the first case. After the stenosed parts had been dilated and an artificial larynx introduced, a laryngoscopic examination was made, when the vocal cords were observed to meet in the middle line, and not to move much apart during inspiration, and on the left cord there was a little erosion about the size of the space occupied by a half barley corn.

The third case was that of a woman, aged 21, who was admitted into the Glasgow Royal Infirmary, suffering from great dyspnoea, for the relief of which tracheotomy was immediately performed. An inquiry into the history of the case showed that about sixteen months previous to admission the patient contracted syphilis, and about seven months subsequent to that time, she developed a cutaneous eruption, and began to suffer from sore throat and loss of voice. On admission the whole of the fauces was seen to be greatly swollen and hyperæmic, but on account of the distressing dyspnoea no examination of the larynx could be made. After tracheotomy was performed the patient breathed freely, and in a few days a satisfactory view of the larynx was obtained, and showed

that the entire mucous membrane was thickened, and the parts above the true vocal cords were occupied by a submucous growth, except at the posterior part where a gumma had ruptured, and the mucous membrane was occupied by a large sloughing ulcer. The epiglottis was greatly contorted, and ulcerated on the right side; there was also a perforation of the soft palate. On account of the obstruction the patient was unable to inhale through the larynx even when the tracheotomy tube was closed, but with an effort she sometimes succeeded in forcing a little air upwards through the glottis.

The tracheotomy tube having an opening in its upper or convex aspect, attempts were made to pass tubes and bougies from below upwards, as well as downwards through the mouth. During the course of a month this treatment was carefully and patiently persevered in, but even although some slight improvement was noticed at the time, the parts soon contracted again. At no time was the patient able to inspire more than a small quantity of air through the glottis, nor was she able to speak otherwise than in a feeble whisper.

At this stage of the case it was apparent that no lasting benefit could be had from dilatation by means of bougies alone. A tupelo dilator, the size of a No. 4 urethral catheter, was therefore introduced as described in Case I, and by a gradual process the larynx was dilated sufficiently to admit the little finger, the dilatation was then discontinued, and the patient requested to come to the ward three times a week for the purpose of having bougies passed. Notwithstanding her careful attention to instructions and the regular passage of bougies, the larynx rapidly contracted, so that within a week or ten days the condition of things was no better than formerly. During all this time the tracheotomy tube was retained, and it is needless to mention that the patient was also under constitutional treatment. On account of local irritation, induced by the passage of the bougies, &c., it was deemed advisable to discontinue any attempts at local treatment for a few weeks. After the parts had been restored to quiescence by rest for four weeks, the stenosis had become so complete that the patient was unable to make herself understood, although still a small quantity of air could be forced through the glottis when the tracheotomy tube was closed. No air passed downwards even with forced inspiration. It was therefore very apparent that treatment on the lines formerly pursued was quite inadequate to meet the requirements of the case, and that the only operation which would permit the patient to breathe permanently by the mouth was to dilate the larynx

again with a tupelo wood dilator, but instead of trusting to the passage of bougies keeping the passage open, to introduce an artificial larynx. This was done, and the patient is now able to converse freely in a loud whisper; she breathes only by the mouth, and her general health is also greatly improved.

Observations.—The cases have been so fully described that little further requires to be said. The advantage of the mode of treatment adopted in these three cases is sufficiently apparent. When it was found impracticable to dilate by means of tubes or bougies—a mode of treatment which has been successfully practised in certain forms of laryngeal stenosis—the only alternative offering any prospects of success was to perform thyrotomy, and excise the obstructing tissues. The advisability of resorting to this operation was being seriously considered when the idea suggested itself to attempt dilatation by means of tents. The first method thought of was to introduce tangle tents, but on experimenting with them, it was found that not only was their expansion too rapid, but on account of the friability of the sodden tangle, some difficulty might be met with in extracting it from the larynx. Sponge tents were found to be useless, but Sussdorff's tupelo wood dilators answered admirably. The expansion of the wood takes place by absorption of fluid through its transverse section. On this account the increase in bulk of the tent is slow, and if a ligature be tied round one end of it, the expansion takes place from the free end only, the ligature preventing the imbibition of fluid by the other end, consequently the dilator assumes the form of a solid cone, and may, thereby, be easily extracted. The method of using the tupelo wood tents is as follows:—Tracheotomy having been performed a week or ten days previously, and a large size tracheotomy tube inserted at the time of the operation, the wound in the neck is sufficiently healed to permit the patient, in most cases, to breathe easily after the removal of the tube. In the case of syphilitic stenosis, however, the contraction of the wound took place so rapidly that the tracheotomy tube could not be kept out for more than a couple of minutes at a time, so that the dilator required to be passed upwards through an opening in the convex side of the tube. In most cases, however, the tracheotomy tube may be removed without danger to the patient. This having been done, with the aid of the laryngeal mirror a small sized laryngeal probe should be forced downwards through the stenosed tissue, and brought out through the wound in the neck. To the end of this probe,

two strands of silk ligature should be tied, dragged upwards through the larynx and mouth, and the free ends knotted externally, so that a circle of ligature is made, part of which occupies the larynx. The tracheotomy tube is then reinserted. Within the next twenty-four hours the ligature will be found to have swollen by the absorption of saliva, &c., and to have enlarged the opening in the larynx. The thickness of the ligature may then be increased by untying the free ends, and to the upper one four or six strands of silk should be fixed. By waxing the knot well, and compressing it with forceps, the thicker skein can easily be dragged through the larynx, and made to replace the smaller one, and so on day by day, the size of the passage may be gradually increased—first, by the employment of silk ligatures, and subsequently, by the introduction of hard hemp cords.

When the passage is large enough to admit a No. 10 urethral catheter, a tupelo wood dilator may be inserted. The smallest used is about the size of a No. 4 catheter. The dilators as prepared are about 4 inches in length. The pointed end of the dilator should be dipped in melted wax for the purpose of facilitating introductions, and closing the orifices of the fibro-vascular bundles. A silk ligature should be tightly wound round the point of the tent, and made to pass through it several times, so as to prevent the danger of slipping. One end of the ligature should be tied to the lower end of the cord, which passes through the larynx, while the other end of the ligature should be passed through the dilator about one-eighth of an inch from its lower extremity. The length must be determined by the size of the larynx and the extent of the stenosis. The point of the dilator should pass one-fourth of an inch above the uppermost limit of the constriction, while its lower end should rest upon the convex side of the tracheotomy tube to which it should be tied firmly. In two or three days the tupelo wood will be found to have swollen to its maximum size, so that further dilatation by it is not to be looked for. Larger sizes of dilators should then be substituted until the passage through the larynx is as large as the normal trachea of the individual, then the pharyngeal limb of an artificial larynx should be passed, and retained in position. There is not much danger of over distending the larynx, or of injuring the cartilages by tupelo wood, as moderate pressure from without readily reduces the bulk of the dilator, but while being spongy in this respect, the wood remains tough.

The only question now remaining for consideration is whether those patients, whose cases have just been narrated,

must be condemned to wear an artificial larynx during the course of their life, or may something more be done for them? In the case of syphilitic stenosis, the tendency of the cicatricial tissue to contraction is so great that little hope can be entertained of relieving the patient further, but in the other two, after cicatrisation is complete an attempt will be made to remove the tubes, and close the opening in the neck.



